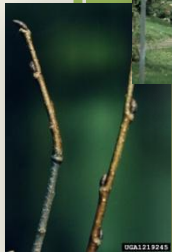


Elm

American elm: *Ulmus americana*

Slippery elm: *Ulmus rubra*

Rock elm: *Ulmus thomasii*



American elms have been decimated by Dutch elm disease which was brought from Europe in the 1930's. However, the **volume of elm has shown signs of recovery** since 1996 with increased growth rates and increased numbers of small trees.

Unfortunately, **mortality remains quite high** and has increased in the last 12 years. Elm accounts for less than 2% of all volume and growth of trees in Wisconsin, but 9.5% of total mortality.

Elm is **not an important timber species**, and is mainly used for fuelwood and pulpwood. It's prevalence in southern Wisconsin may make it a valuable species for biofuel production.

- [How has the elm resource changed?](#)
Growing stock volume and diameter class distribution: 1983, 1996, and 2008
- [Where does elm grow in Wisconsin?](#)
Growing stock volume by region with map
- [How fast is elm growing?](#)
Average annual net growth by region and year: 1983, 1996, and 2008
- [How healthy is elm in Wisconsin?](#)
Average annual mortality: 1983, 1996, and 2008
- [How much elm do we harvest?](#)
Roundwood production by product and year: 1997, 2003, and 2006
- [How much is elm selling for?](#)
Prices for cordwood and sawtimber: 2000 to present
- [How much elm biomass do we have?](#)
Oven-dry tons by region of the state: 2008

“How has the elm resource changed?”
Growing stock volume and diameter class distribution by year

The volume of elm in Wisconsin in 2008 was about 383 million cft or 1.8% of total [growing stock volume](#) (Chart 1). The vast majority (78%) of this is American elm with 21% slippery elm and less than 1% rock and Siberian elm.

Volume decreased 38% between 1983 and 1996 (Chart 2), mainly due to mortality related to Dutch elm disease, but has increased 43% since 1996, especially in larger size trees (over 13 inches).

The number of [sapling](#), [poles](#), and [sawtimber](#) size trees has increased for most elm species since 1996, 29% for poles and 40% for sawtimber (Chart 3). [Seedling](#) numbers have decreased slightly.

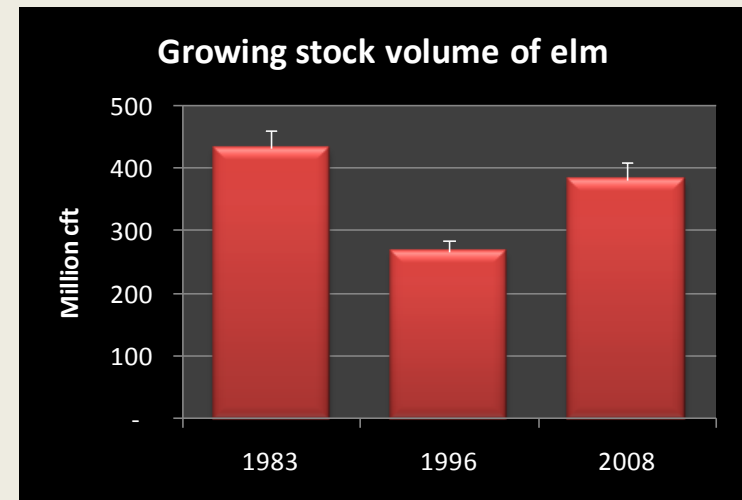


Chart 1. Growing stock volume (million cubic feet) by inventory year.
 Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

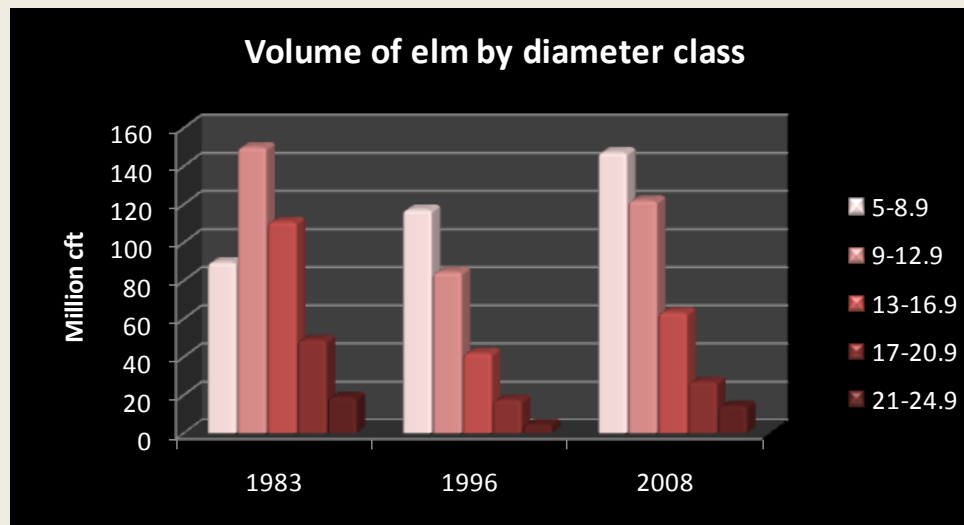


Chart 2. Growing stock volume (million cubic feet) in 1983, 1996, and 2008.
 Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

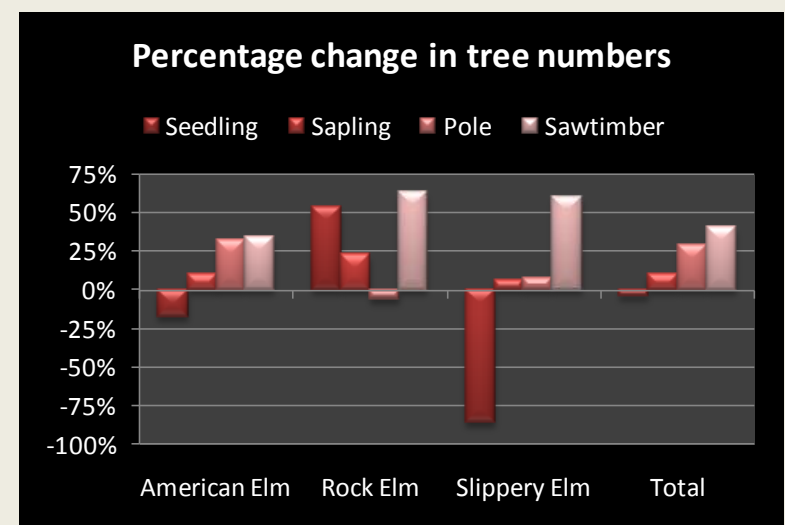
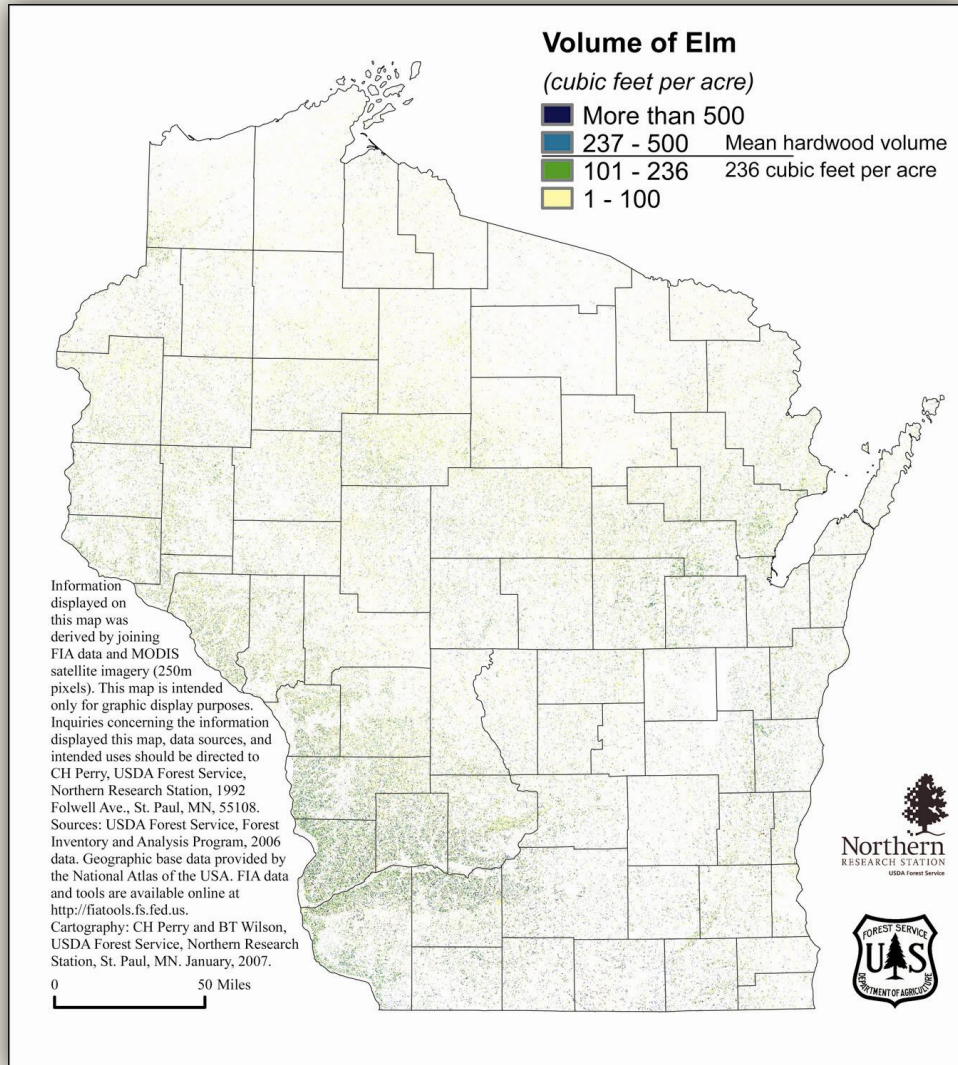


Chart 3. Percentage change in the number of live trees by size class between 1996 and 2008.
 Source: USDA Forest Inventory and Analysis data 1996, and 2008.

"Where does elm grow in Wisconsin?"

Growing stock volume by region with map



Elm is a southern species with about 70% of volume located in southern Wisconsin and another 14% in the central part of the state.

American and slippery elm are found primarily in the oak-hickory [forest type](#) and, to a lesser extent, in bottomland hardwoods. Rock elm is largely found on the maple-basswood forest type.

Table 1. Growing stock volume (million cft) by species and region of the state.

Species	Central	North east	North west	South east	South west	Total	Percent of total
American Elm	46	31	33	69	121	301	78%
Rock Elm	0	1	0	-	0	1	<1%
Siberian Elm	2	-	-	0	0	2	1%
Slippery Elm	4	2	2	17	55	79	21%
Total elm	53	34	34	86	176	383	100%
Percent of total	14%	9%	9%	23%	46%	100%	

Source: USDA Forest Service, Forest Inventory and Analysis 2008 data

Additional tables: Volume by county in 2008 ([pdf](#); [Excel](#))



"How fast is elm growing?"

Average annual net growth by region and year

Average annual net growth of elm has increased by over 30% in the last decade, from 6.2 million cft per year in 1996 to 8.2 million cft/year from 2004 to 2008 (Chart 4). This represents 1.4% of statewide volume growth.

Table 2. Average annual net growth (million cft/year) of growing stock and the ratio of growth to volume by region of the state.

Region	Net growth	Percent of Total	Ratio of growth to volume
Central	2.5	30%	4.7%
Northeast	1.0	12%	2.9%
Northwest	2.3	27%	6.5%
Southeast	2.2	26%	2.5%
Southwest	0.3	4%	0.2%
Statewide	8.2	100%	2.1%

Source: USDA Forest Inventory and Analysis 2008

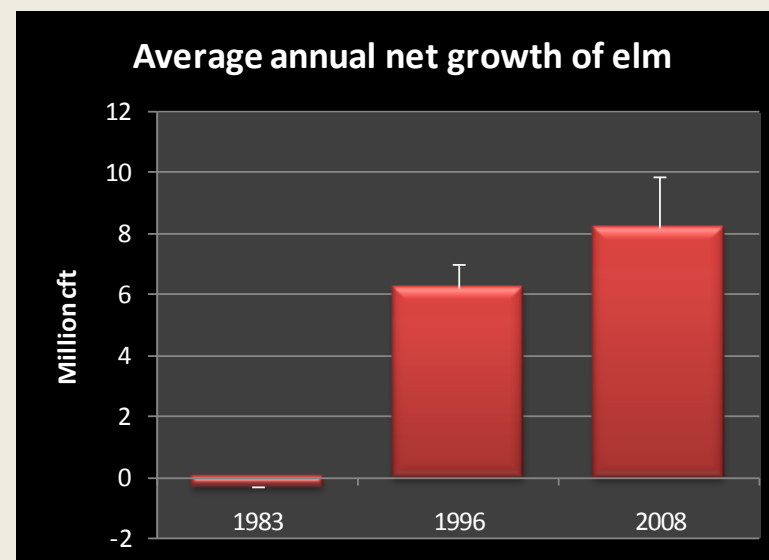


Chart 4. Average annual net growth (million cubic feet).
Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Although southwest Wisconsin has the highest percentage of elm volume (46%), the ratio of growth to volume is lowest in this part of the state (0.2%, Table 2). This is mostly due to high mortality rates. The ratio of growth to volume for elm is 2.1%, lower than the 2.8% for all species in the state.

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How healthy is the elm resource in Wisconsin?"

Average annual mortality: 1983, 1996, and 2008

Average annual mortality of elm, about 19.4 million cft per year, has increased since 1996 by 43% (Chart 5).

The ratio of mortality to gross growth is about 70% for elm and is surpassed only by paper birch and balsam fir (Table 3). This ratio is **over twice as high as the average for all species** which is 26%.

Table 3. Mortality, gross growth and the ratio of mortality to gross growth.

Species	Average annual mortality (cft)	Average annual gross growth (cft)	Mortality / growth
American Elm	17,033,678	22,665,408	75%
Rock Elm	44,654	108,395	41%
Slippery elm	2,279,545	4,533,299	50%
Total elm	19,357,877	27,593,701	70%

Source: USDA Forest Inventory and Analysis data: 2008

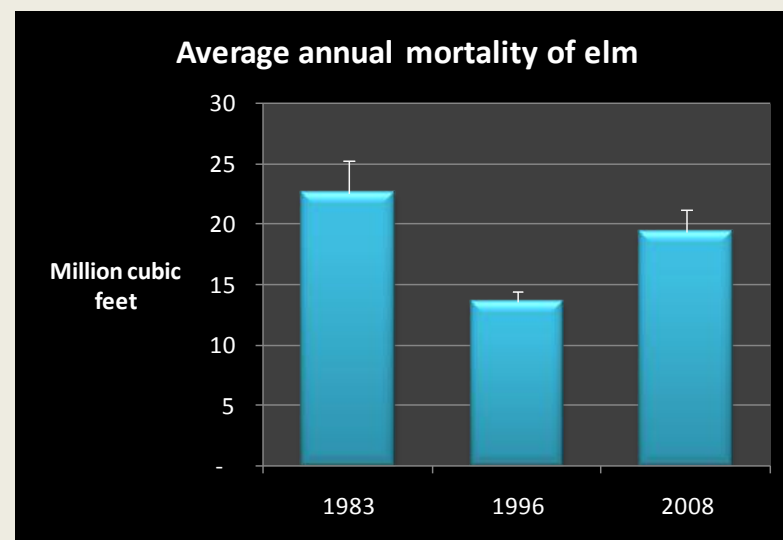


Chart 5. Average annual mortality (million cubic feet) by inventory year.

Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Whereas elm accounts for 1.8% of volume and 1.4% of net growth, it makes up 9.5% of total mortality statewide. This high mortality is probably due to the continuing affect of Dutch elm disease.

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).



"How much elm do we harvest?"

Roundwood production by product and year

In 2003, Wisconsin produced about 5.6 million cft of elm [roundwood](#) or about 1% of total statewide product (Chart 6). At that time, production was evenly distributed between pulpwood, sawlogs and fuelwood.

From 2003 to 2006, elm pulpwood production decreased by 1.5 million cft or 84%.

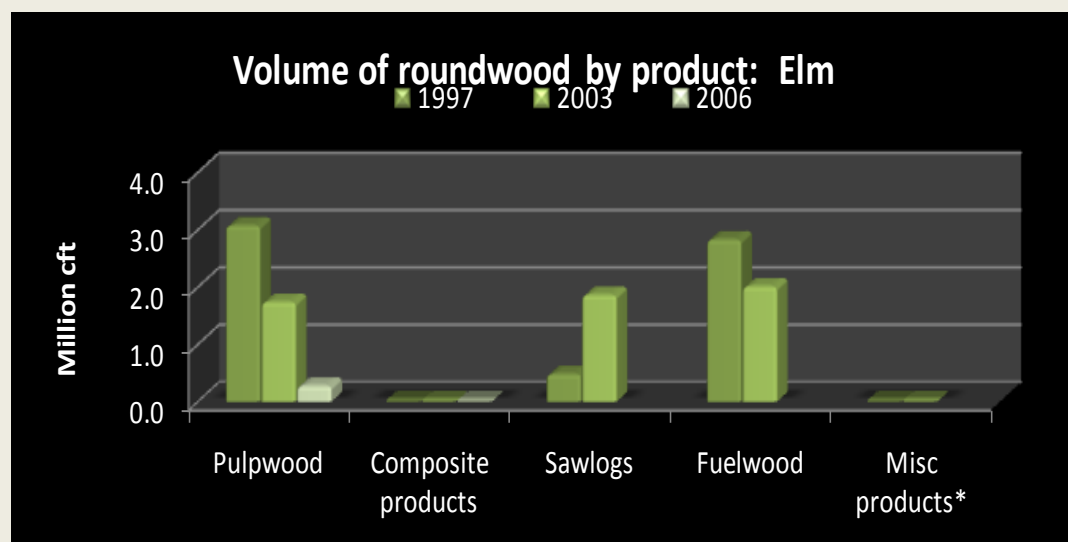


Chart 6. Volume of roundwood products. The most recent numbers for pulpwood and composite products are from 2006 and the most recent numbers for sawlogs, fuelwood and miscellaneous products are from 2003 (Ron Piva).

* Miscellaneous products include poles, posts, pilings and veneer.

Source: Timber Products Output Mapmaker, http://ncrs2.fs.fed.us/4801/fiadb/rpa_tpo/wc_rpa_tpo.ASP

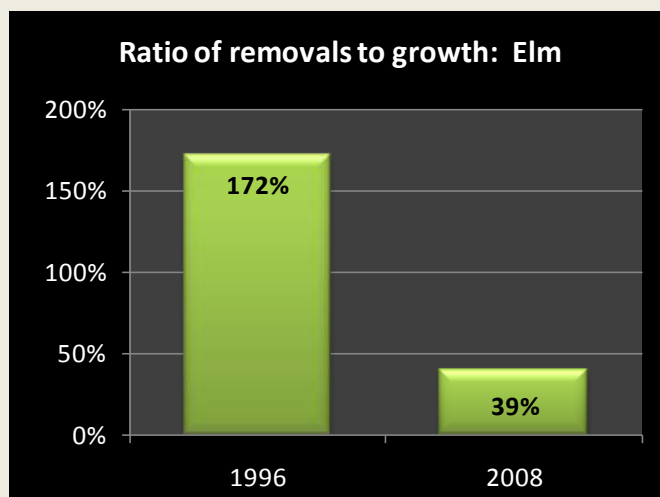


Chart 7. Ratio of volume harvested annually to net growth. 1983 data is not included as growth was negative.

Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008.

The ratio of removals to growth is 39% (Chart 7), far less than the statewide average of 56% for all species. Removals for elm are low compared to the volume of this species. Removals were much higher in 1996.

Additional tables:

Average annual growth, mortality and removals by region ([Pdf](#), [Excel](#)).

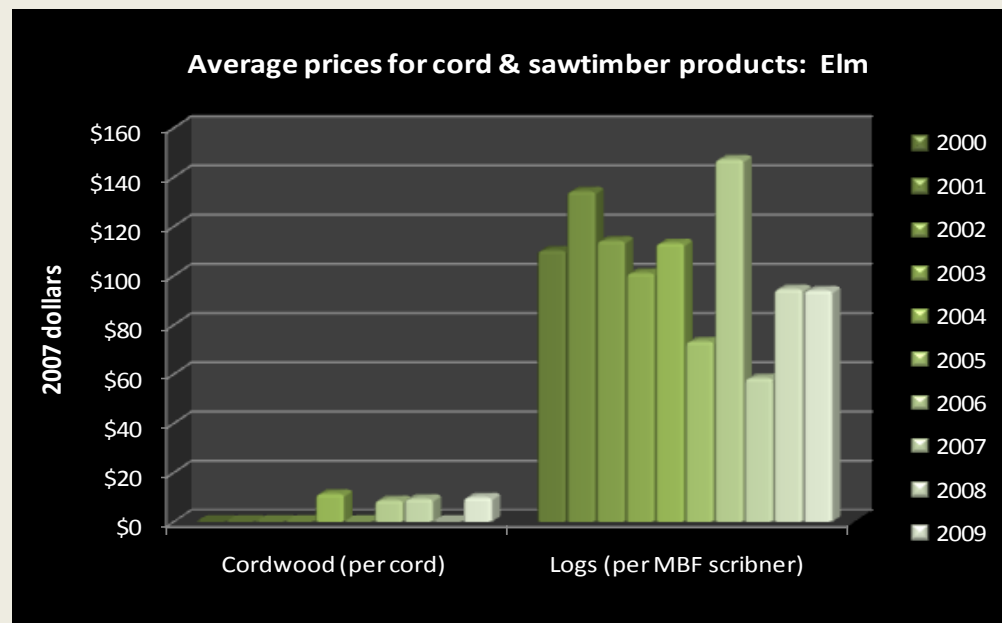


"How much is elm selling for?"

Prices for cordwood and sawtimber: 2000 to present

There is substantial variability in timber prices from region to region. The prices reported here are the [weighted average stumpage prices](#) (Chart 8) from Wisconsin Administrative Code Chapter NR46.

Sawtimber prices, although quite high in 2006, have otherwise decreased since 2001 (Table 4). Prices for logs are much lower than the statewide average for hardwoods.



Source: Wisconsin Administrative Code Chapter NR46, 2000 to 2009

Table 4. Average weighted stumpage prices (adjusted for inflation to 2009 dollars) by year for Wisconsin.

Product	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average for all hardwoods
Cordwood (per cord)	NA	NA	NA	NA	\$11	NA	\$9	\$9	NA	\$10	\$19
Logs (per MBF)	\$110	\$134	\$114	\$101	\$113	\$73	\$147	\$58	\$95	\$94	\$140

Source: Wisconsin Administrative Code Chapter NR46, 2000 to 2009



"How much elm biomass do we have?"

Oven-dry tons by region of the state

There were 13.4 million oven dry tons (ODT) of elm biomass in 2008, an increase of 2.9 million ODT or 28%, from 1996. This species group represents 2.3% of all live biomass statewide. As with volume, most elm is located in southern Wisconsin (Chart 9).

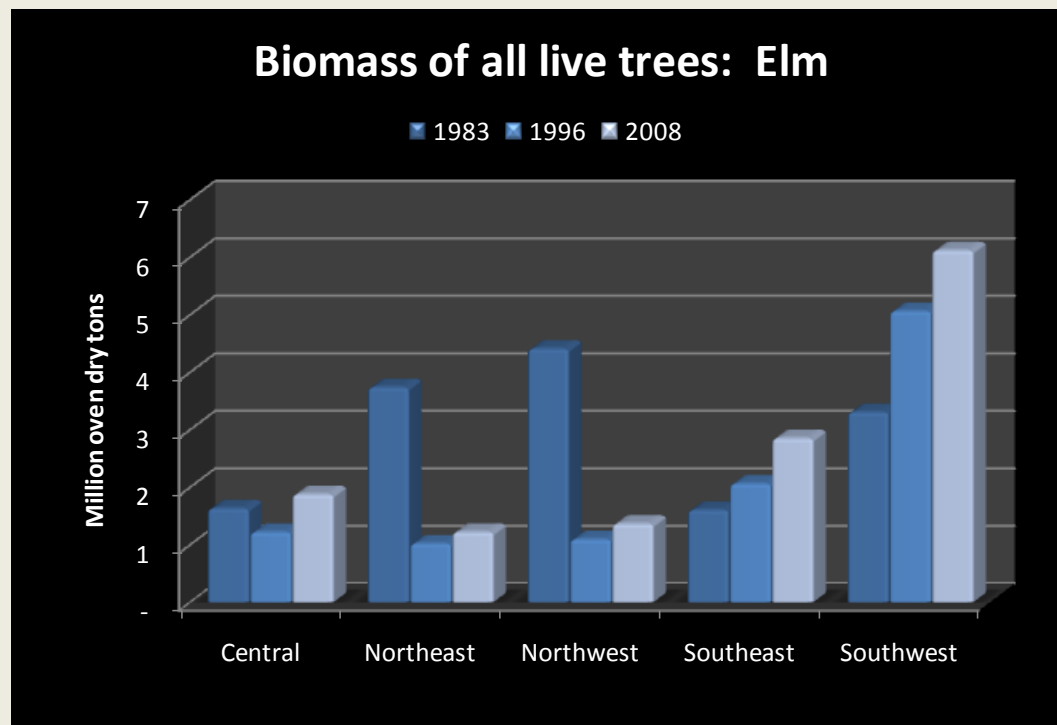


Chart 9. Biomass (million oven-dry tons) by year and region.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008

Elm has a slightly lower density than other commercial hardwood species in Wisconsin, with a ratio of biomass to volume of 47.9 oven-dry lbs. per cubic foot (ODP/cft). The average for all hardwoods is about 50.1 ODP/cft and for all trees is 46.8 ODP/cft.

Approximately, 73% of all elm biomass is located in the main stem and 22% in the branches.

Additional tables: Biomass by county in 2008 ([pdf](#); [Excel](#))